

THE CONSTRUCTION OF LOGISTICS INDUSTRIAL PARKS IN SEAPORTS IN PROSPECT

¹MOROZOVA IRINA, ²ONYSHCHENKO SVETLANA

^{1,2}*Odessa National Maritime University, Ukraine*

ABSTRACT

The Article highlights the issues on creation of logistic industrial parks in seaports. System description of industrial park is drafted. The term “logistic industrial park” is defined and effect of the industrial parks creation in sea ports is determined: for the Lead Company, partner (participating) companies, port and region. Prerequisites’ identification has been analytically determined to outline economic benefits of manufacturers’ participation in the parks, also the possibility to follow the principle “right on time” for the account of better coordination and decrease in time loss has been verified.

Keywords: *logistic industrial park, seaport, economic benefits.*

1. INTRODUCTION

Tendency of last decades is a transformation of sea trade ports into centres with variety of services which exceed understanding of traditional services provided to vessels and cargoes. Therefore, major ports attract manufacturing oriented to import raw materials and export of goods, they concentrate enterprises of manufacturing industry and this is a specific feature of so called ports of fourth generation.

Regardless of the port evolution, a new form of business organization known as “industrial park” speeds up its development on the territories that have nothing to do with sea.

2. INDUSTRIAL PARK

Let’s outline that “industrial park” is a kind of “park” which has been organized quite frequently within the last decades. We can identify the following parks as industrial ones: techno-park, industrial park, innovative centre (park), business incubator, university research centre, scientific centre, etc. (see Figure 1).

Specifics of each park are defined by prevailing of one of the components in its functional distribution – whether it is science, manufacturing, commerce or education.

Verkhovna Rada has adopted a law “On Industrial Parks” in March 22, 2012, and consequently made the term valid on the territory of Ukraine. This legal instrument has identified the basic principles, procedures and terms for creation and functioning of industrial parks to secure economic development and improvement of territories’ competitiveness, activate investment and innovative projects, create new opportunities for employment and develop modern manufacturing or market infrastructure. As identified, industrial park - is a certain territory within the boundaries of which participants of industrial park can perform economic activity in sphere of industrial manufacturing, science and research, communication and information technologies. The right to create industrial parks on the private territories is entrusted to economic unions, sole proprietors that possess the territory and, according to the given instrument, meet the requirements in relation to their use in frames of industrial park. Minimum size of industrial park is stipulated within 7 ha. The Lead Company developed by the initiative party obtains the land for 30 years for a rent.

From the Owner’s point of view, Industrial Park is a specialized object of profitable real property and its activity is arranged by the leading company. Today there are two basic ways to create Industrial Parks in Ukraine: manufacturing and administrative buildings are reconstructed and territory is cleared out for new users; new premises for offices and stores are built by the landowner under the warranty of long-term rent by the leaseholder.

Industrial parks may also appear on the initiative of the local administration, which takes over the design and equipping of pre-engineering infrastructure of industrial zones on municipal land, while attracting tenants or buyers for designated sites.

Figure 2 shows systematic understanding of industrial park.

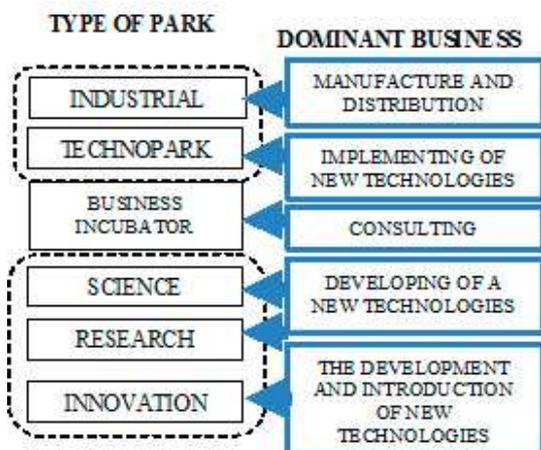


Figure 1 Park scheme depending on its major activity

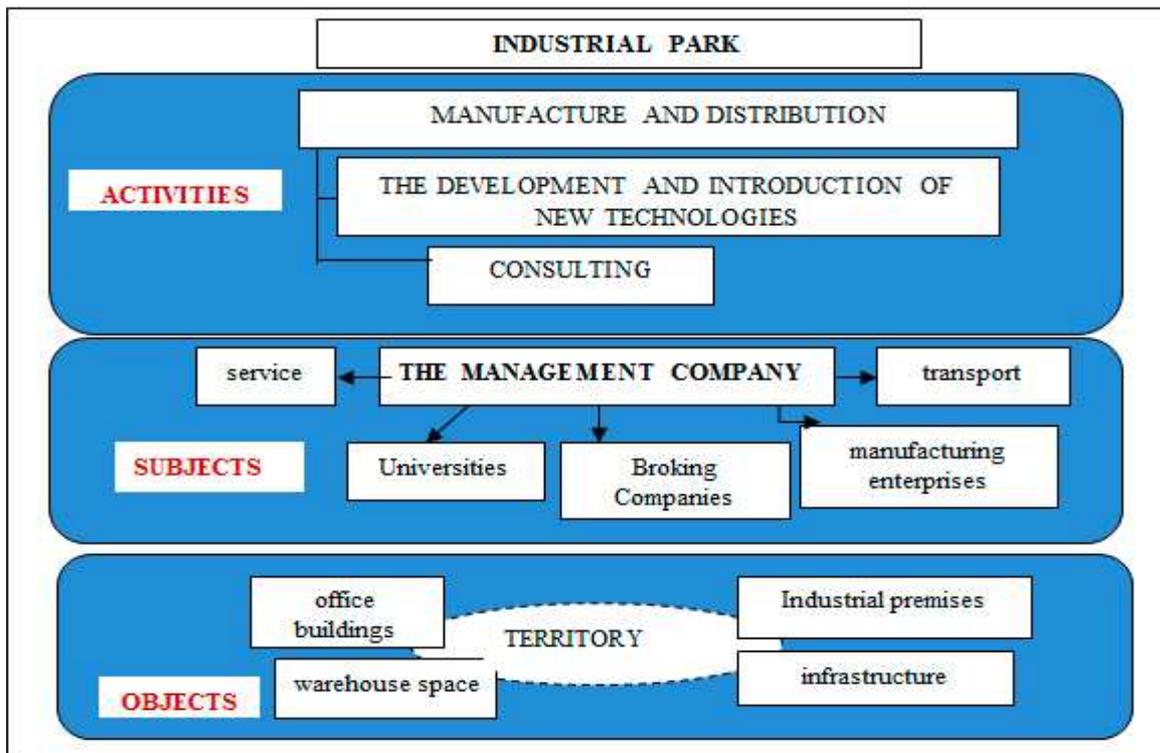


Figure 2 Systematic image of industrial park

Decomposition is performed in three dimensions, each of them deals with identified aspect of industrial park - material objects, subjects and activities. The whole idea of industrial parks is very promising and cost-effective for both the companies and the state. However, it should be outlined that the experience of creating separate industrial parks in Ukraine cannot be considered a success. It might have resulted from wrong choice of location, the lack of design prerequisites and poor management level.

3. LOGISTIC INDUSTRIAL PARK IN THE SEAPORT

Services provided by industrial parks may include a complex of logistic services and in case the latter is the dominant over the rest of the activities or it is equal with the manufacturing, another separate type can be identified – Logistic Industrial Park.

Therefore, Logistical Industrial Park can be identified as a territory with a complex of objects for manufacturing purposes, united by a single infrastructure system, with a certain objective to lead economic activity in sphere of industry and logistics.

Taking into account that a modern port is an assembly of the whole logistic services variety, one of the variants to create logistic industrial parks is the employment of the territory and infrastructure of sea trade ports or territories adjacent to them. As it is known, ports provide services for storage, stowage, warehousing, packing, etc., of the goods that, broadly speaking, are not necessarily for external trade. Thus, use of ports' property and logistic service to create logistic industrial parks is a perfect opportunity to develop national industrial parks.

On the other hand, creation of logistic industrial parks may serve as a basis for the ports' development as well, especially if to speak about circumstances in the country when new by-law on the Ukrainian ports has already entered into force and has altered the port operation system completely.

The expected outcome of the new legislative provision is the involvement of private funds in the form of concession, it may provide financial basis for the creation of logistic industrial parks in ports. Here it is necessary to outline that ports' existing economic and technical basis complies with the majority of requirements for industrial parks, and this fact specifies minor financial inflows comparatively with situations when industrial parks are built on territories not occupied before.

Considering the accent in logistic industrial parks located on the ports territories the very logistic service and park structure has to include the following elements: expediting companies (or their branches), customs brokers, warehouse's representatives and offices of shipping companies. Such structure shall provide essential logistic service for enterprises.

4. EFFECT OF PARTICIPATION IN LOGISTIC INDUSTRIAL PARKS AT SEAPORTS

It is obvious that the primary motive for the enterprises to join industrial park is the economic benefits. The effect obtained from creation of logistic industrial parks can be seen in various levels:

- the stakeholders get reduction of cost for manufactured goods due to effective logistics, minimization of transport operations and optimization of customs procedures;

- the port can use the territories and infrastructure in a more effective way and broadens its activities due to services provision to the cargoes which technically do not belong to external economic activity;
- the region on the whole shall get considerable improvement of economic situation on the account of the creation of new jobs, investments and increase in manufacturing ratings.

Let's analyse more precisely the economic effect for enterprises. The main criterion to identify effective logistics is minimization of logistic operations and at the same time compliance with the main logistic rules. Principal logistic criteria are money and time and in compliance with the given approach let's provide further analysis. We shall compare expenditures on logistic operations for an enterprise in situation when it is a participant (member) of logistic industrial park and its manufacturing premises are located in another place.

In practice, the following three situations might be possible:

- 1) The enterprise works with import raw materials, its finished commodity is disseminated on the territory of Ukraine (terms of goods delivery EXW);
- 2) The enterprise works with national (domestic) raw materials, its finished commodity basically is disseminated for the export (terms of goods delivery FOB);
- 3) The enterprise works with national (domestic) raw materials, its finished commodity is disseminated on the territory of Ukraine (terms of goods delivery EXW).

Situation when enterprise works with import raw materials but export its products is not common in Ukraine. We shall provide analysis for the first situation

(Figure 3) and in other cases the methodology is identical. Formation of logistic expenditures due to basic variant:

$$R = \sum_{i=1}^8 R_i, \tag{1}$$

Where R_1 - expenditures for the raw materials delivery (shipping and discharging); R_2 - expenditures for customs procedures; R_3 - expenditures for other formalities in the port; R_4 - expenditures for raw materials storage in the port; R_5 - expenditures for vehicle/railway transportation of raw materials to the warehouses of the enterprise; R_6 - expenditures for raw materials storage on the premises of the enterprise; R_7 - manufacturing expenditures; R_8 - expenditures for finished commodity storage.

The main parameters that have impact on the level of expenditures (1) are the annual volumes of raw materials delivery Q_r and finished commodity Q_g , distance between port and manufacturing premises (warehouses) of the enterprise L , average time for raw materials storage in the port T_r , in the warehouse T_w and average time for finished commodity storage in the warehouses of the manufacturer T_g .

Let's analyse in details the expenditure articles which depend on the manufacturer's location.

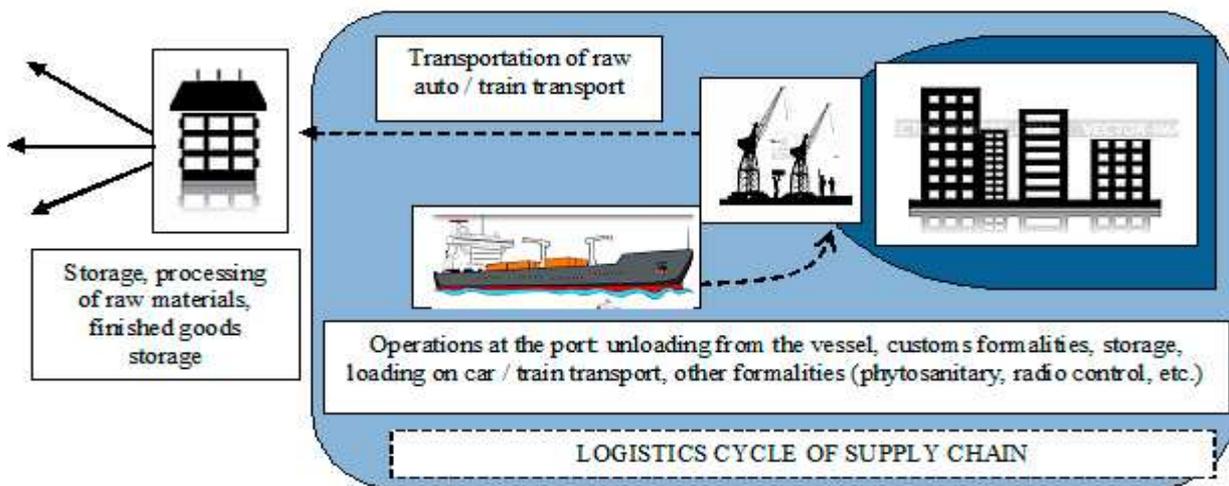


Figure 3 Considered situation for expenditures analysis

Expenditures for vehicle/railway transportation of raw materials to the warehouses of the enterprise:

$$R_5 = f_a \cdot L \cdot Q_r / q_a, \tag{2}$$

$$R_5 = f_{rw}(Q_r, L, q_{rw}) \cdot Q_r, \tag{3}$$

where f_a, q_a - tariff for the transportation by vehicle and its loading; f_{rw}, q_{rw} - tariff for railway transportation and loading of carriage.

Expenditures for storage of raw materials in the warehouses of the enterprise:

$$R_6 = c_w \cdot S_w(Q_r) + r_w(Q_r), \tag{4}$$

c_w - cost of warehouse rent (per sq.m.); s_w - essential area of the warehouse (sq.m.); r_w - operating costs in the warehouse.

Manufacturing expenditures

$$R_7 = c_m \cdot S_m(Q_g) + r_m(Q_g) + r_{mc}, \quad (5)$$

c_m - cost of manufacturing premises rent (per sq. m.); S_m - rented manufacturing premises (sq. m.); r_m - variable manufacturing expenditures; r_{mc} - constant manufacturing expenditures (premises rental, as a rule, also relates to constant manufacturing expenditures, though, in context of the given task, it is significant to define its relation to the planned volume of production).

Expenditures for the finished commodity storage:

$$R_8 = c_w \cdot S_w(Q_g) + r_w(Q_g) \quad (6)$$

Essentially the warehouses expenditures may be unified:

$$R_{6+8} = c_w \cdot S_w(Q_r, Q_g) + r_w(Q_r, Q_g) \quad (7)$$

If the similar manufacturing is located in the logistic industrial park in the port the expenditures for the storage R'_{6+8} and manufacturing R'_7 , will be identified as follows:

$$R'_7 = c'_m \cdot S'_m(Q_g) + r'_m(Q_g) + r_{mc} \quad (8)$$

$$R'_{6+8} = c'_w \cdot S'_w(Q_r, Q_g) + r'_w(Q_r, Q_g) \quad (9)$$

In their turn, transport expenditures for the raw materials delivery on the territory of the port (f' - transport tariffs) to the manufacturing premises will be calculated as follows:

$$R'_5 = f' \cdot Q_r, \quad (10)$$

When the rest of the expenditures are equal, the disparity of general expenditures due to basic variant and variant when the manufacturing is located in the port may be as follows:

$$\Delta = R_5 + R_{6+8} + R_7 - R'_5 - R'_{6+8} - R'_7 \quad (11)$$

At $\Delta > 0$ the economic benefits of industrial park in the port are obvious. It's clear that given effect is obtained not only due to ratio of cost parameters but manufacturing and storage volumes (amounts).

Besides the expenditures retrenchment due to manufacturing premises location, there is also the time factor, which is of utmost importance. When manufacturing is located in the port such essential operations as reloading, customs proceedings and other obligatory formalities can be easily controlled and coordinated. All these factors in their turn allow applying the logistic principle "right on time" in practice [1].

Let's introduce the following terms: \bar{t}_i - average time of i - operation performance in the logistic cycle; \bar{t}_1 - raw material delivery (shipping and discharging), \bar{t}_2 -

customs formalities, \bar{t}_3 - other port formalities; \bar{t}_4 - raw material storage in the port; \bar{t}_5 - raw material transportation from the enterprise warehouse. Given logistic cycle deals with raw material delivery and does not include manufacturing logistics, which itself can be the subject for separate research. The average time for the given logistic cycle:

$$t = \sum_{i=1}^5 \bar{t}_i \quad (12)$$

It is essential that probabilistic nature of time for each operation reveals necessity to take into consideration the standard deviation $\sigma_i (i = \overline{1,5})$. The absence of correlation between period of each operation allows to define time standard deviation for logistic cycle in the following way:

$$\sigma_t = \sqrt{\sum_{i=1}^5 \sigma_i^2} \quad (13)$$

The probability of timely executed logistic cycle within the given period $[t_1, t_2]$:

$$P(t_1 \leq t \leq t_2) = \Phi\left(\frac{t_2 - \bar{t}}{\sigma_t}\right) - \Phi\left(\frac{t_1 - \bar{t}}{\sigma_t}\right) \quad (14)$$

For the case when the manufacturing is located in logistic industrial park, the value (13) is going to be considerably lower in comparison with the other option and, evidently, the probability to perform the whole logistic cycle on time is much higher.

5. CONCLUSIONS

We consider port territories to be a beneficial branch for creation of industrial parks in Ukraine, especially taking into consideration that ports meet almost all the requirements for industrial parks and parks' creation on the premises of the port does not require big amounts of financial inflow as it usually does when industrial parks are created on the territories not previously occupied. Due to the fact that ports are the concentration of logistic services, the specific feature for industrial parks located on the territory of the port is considerable logistic component in the functional objective of the park, in view of this, such parks can be defined with the term «logistic industrial parks». Advisability for entities to participate in logistic industrial parks is determined by economic benefits and opportunity to optimize logistic operations.

6. REFERENCES

[1] LUKINSKY, V.S., *Models and methods of the logistics*, Piter, 2007.